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work. Previous to the beginning of the state survey the U. S. bureau had conducted surveys in the Viroqua area, the Janesville district, Racine county, the Portage district, and the Superior district. The field work and the soil analyses are under the direction of Professor A. R. Whitson, chief of the soils department of the College of Agriculture, Madison.

UNIVERSITY AND EDUCATIONAL NEWS

At Yale University the salaries of professors and assistant professors have been increased by \$49,000 from the alumni fund. The salaries of full professors are to be \$4,000 to \$4,500 and \$5,000, based mainly on length of service, but modified somewhat by university responsibility and personal distinction. In the case of assistant professors the maximum salary is increased to \$3,000.

THE newspapers have contained various inaccurate statements in regard to the Wyman bequest to the Graduate College of Princeton University, it having been at first exaggerated and recently underestimated. The amount of the bequest is, as originally stated in this JOURNAL, between \$2,000,000 and \$3,000,000. All contests of the will have been withdrawn or overruled.

DR. GEORGE BLUMER has been elected dean of the medical school of Yale University, to succeed Dr. Herbert E. Smith.

THE following members of the faculty at the University of Chicago have been promoted from associate professorships, heretofore held by them, to the rank of professor: Leonard Eugene Dickson (mathematics) and Robert Andrews Millikan (physics). The following have been promoted from assistant professors to be associate professors: W. W. Atwood (geology), H. H. Barrows (geography), J. Paul Goode (geography). A. C. Lunn (mathematics), has been promoted to an assistant professorship.

In the School of Mines of Pennsylvania State College the following appointments have been made: Mr. H. D. Pallister, M.E.

(Case), formerly mining engineer with the Chisos Mining Co., Terlingua, Texas, and later instructor in mathematics, Case School, has been appointed instructor in metallurgy and Mr. Victor Ziegler, B.A. (Iowa), M.A. (Columbia), instructor in geology and mineralogy.

APPOINTMENTS in Swarthmore College have been made as follows: George William Lewis, assistant professor of mechanical engineering; Scott B. Lilly, assistant professor of civil engineering; Howard C. Potter, instructor in engineering; Herman Pritchard and John Pitman, assistants in mathematics.

DR. GUY H. SHADINGER has been appointed professor of chemistry at Dickinson College.

ROBERT H. BAKER, A.B. (Amherst), Ph.D. (Pittsburgh), has been appointed acting assistant professor of astronomy at Brown University.

DR. BIRD THOMAS BALDWIN, lecturer on education at the University of Chicago, has been appointed associate professor in education and head of the School of Practise Teaching at the University of Texas.

EDITH M. TWISS, Ph.D. (Chicago), has been appointed assistant professor of botany in Washburn College, Topeka, Kan.

DR. FRITZ PREGL, of Graz, has been appointed full professor of chemistry at Innsbruck.

DISCUSSION AND CORRESPONDENCE

A COMPARISON OF METHODS FOR ESTIMATING FAME

SEVERAL communications have appeared recently in SCIENCE regarding various methods of rating men in position of eminence. Liming, the latest contributor,¹ dwells particularly upon the value of the space and adjective methods, considering these to be best in point of efficiency. In the present article I wish to mention several other possible methods for determining the relative positions of men in point of renown.

Since there is no fixed standard by which degree of renown can be measured, "historiometry" so called can never aspire to the

¹ SCIENCE, N. S., XXXII., 157.

name of an exact science. Fame is exemplified in a multitude of forms. The relative position of two men as regards celebrity may be determined not only by comparing the lines of print or the number of eulogistic adjectives in a biographical sketch; it may be found as well by comparing the number of their portraits and statues in private and public places, or the number of streets and squares and parks, which bear their names, or the number of infants christened in their honor, or the number of brands of cigars, etc., which bear their effigies as trade marks, or in a host of other ways. Each one of these forms by which fame is exemplified carries a certain weight in the establishment of notoriety; the larger the number of objective methods employed, therefore, in reaching an estimate the more nearly do we approach the average opinion of mankind at large. And after all this labor of comparing and averaging the most discouraging feature of historiometry remains, viz., the judgment which is formed in the case of recent men and events may be reversed in generations to come; centuries must elapse before an estimate of this kind can attain a permanent value.

Methods of determining fame may be illustrated best by taking a typical case. I have chosen for this purpose the determination of the relative position as regards celebrity of the two Greek dramatists Sophocles and Euripides. The two poets named lived together the greater part of their lives in the same city; they were surrounded by the same influences, produced each about one hundred plays and died within the same year. In their competitions for the dramatic prize Sophocles was awarded first honors by the Athenians twenty times and Euripides four times. As far as the judgment of contemporaries goes Sophocles might be considered therefore to be five times as eminent as Euripides.

One of the best rapid methods for determining degree of celebrity is a good reference index to the works of the world's great writers. A comparison of the ratios of the number of references to two men in the works of such writers as Plato, Aristotle, Plutarch, Cicero, Montaigne, Goethe, Carlyle or Emerson, will

give a very good idea of the position of these two men in matter of renown. A comparison of the number of references to Sophocles and Euripides made by several writers shows the following:

Writer.	Number of References.		Ratio.
	Sophocles.	Euripides.	
Plato	4	8	1:2.0
Aristotle	16	21	1:1.3
Plutarch	84	217	1:2.6
Epictetus	5	17	1:3.4
Emerson	2	8	1:4.0
Average ratio			1:2.66

The general estimate of the world's great writers would indicate that Euripides was over twice as eminent as Sophocles.

If the two men, who are being rated in position of renown, are poets (as in the present instance), a comparison of the number of times their verses are cited in different dictionaries of popular quotations will give an idea of their relative degree of fame. The following comparisons were made with two dictionaries of quotations.

Dictionaries.	Number of Times Quoted.		Ratio.
	Sophocles.	Euripides.	
Hoyt	6	11	1:1.8
Range	94	228	1:2.4
Average ratio			1:2.1

Since Sophocles and Euripides each produced about one hundred tragedies, the ratio between the numbers of their extant plays will furnish a third means of comparison, the writer who was most popular and most widely copied in ancient times having necessarily the best chances of preservation. A comparison of this kind shows the following:

	Sophocles.	Euripides.	Ratio.
Extant plays	7	18	1:2.6

The greater number of extant plays of Euripides would account in part for the greater number of selections from this poet in the dictionaries of quotations.

A comparison of the number of busts and statues, which have come down from the past, offers another means of estimating the renown of the great men of antiquity. Catalogues of antiquities for two leading museums of Italy show the following:

Museum.	Number of Busts.		Ratio.
	Sophocles.	Euripides.	
Naples, Museum of Antiquities (portico of celebrated men)	2	3	1:1.5
Rome, Capitoline Museum (hall of celebrated men)	1	3	1:3.0
Average ratio			1:2.25

It is interesting to compare the previous estimates with that of Cattell. In the latter's list of 1,000 most eminent men² as determined by the space method Euripides occupies the ninety-ninth position and Sophocles the one hundred and eighty-first position—the latter being nearly twice as far distant from the first position of eminence as Euripides. While these figures do not allow us to fix the exact ratio of eminence, the relative position of the two poets in degree of renown is indicated unmistakably.

I have applied the space method to a comparison of Sophocles and Euripides, using the histories of Curtius and Grote with the following results:

Historian.	Lines of Space.		Ratio
	Sophocles.	Euripides.	
Curtius	200	773	1:3.86
Grote	38	71	1:1.87
Average ratio			1:2.85

The mean ratio of the averages determined by the five different methods is 1:2.5, the range of value being between 2.1 and 2.9. Notwithstanding, therefore, the overwhelming number of victories which Sophocles achieved over his rival for dramatic excellence, the verdict of mankind seems to be that as far as eminence and fame are concerned Euripides is over twice as renowned as Sophocles.

The method of reference frequency may be applied not only to estimating the position of a man as regards fame, but it may be extended to determining the relative importance of his different achievements. A typical example of the latter is the problem of determining the order of Shakespeare's plays in point of eminence. An index of popular quotations from Shakespeare shows the following order of quotation frequency: first five, Hamlet quoted 191 times, Macbeth 111, Merchant of Venice 68, Julius Cæsar 63, Othello 62; last five, Coriolanus quoted 5 times, Timon of Athens

² *Popular Science Monthly*, 1903, p. 359.

5, first part of Henry VI. 4, Titus Andronicus 3, Pericles 1. The above not only confirms the opinion of Goethe and other critics as regards Hamlet, which excels the other plays of Shakespeare as much as Shakespeare himself excels other dramatists, but it also bears out the general verdict concerning Pericles, which, in the words of White, "is too clumsy, too feeble, too monstrous, too revolting to be an original work of Shakespeare." It would be difficult to find another rapid objective method by which the plays of Shakespeare could be arranged in order of eminence.

Reference frequency of persons, books, works of art, events and all other subjects as determined from indexes to standard works, or indexes of current literature, or library catalogues or other means of reference, constitutes one of the best methods for determining rank in point of celebrity. Its great advantage is the quickness with which one can arrive at the combined judgment of many minds. The method admits of great extension in its manner of application and is recommended to those interested in the pursuit of "historiometric" research.

C. A. BROWNE

SCIENTIFIC BOOKS

Concealing-colors in the Animal Kingdom:

An Exposition of the Laws of Disguise through Color and Pattern, being a summary of Abbott H. Thayer's Discoveries. By GERALD H. THAYER. New York, The Macmillan Co.

By far the most important single contribution that has been made to the much-discussed matter of animal coloration appears under the above title. In an introduction, Abbott H. Thayer, whose "law underlying protective coloration" (1896), with subsequent additions and enlargements, has now become a part of the literature of the subject, and of which the present elaborate volume is the logical amplification, gives a succinct summary of the main features of the book, and outlines the psychological view point from which the succeeding observations are made. An artist of the high-